

STUDIO THEATRE

Building Program

For information, coordination, and review

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100 Performance Spaces – Studio Theater

This category includes the studio theatre and related spaces that are physically inseparable from it.

101 Studio Theatre

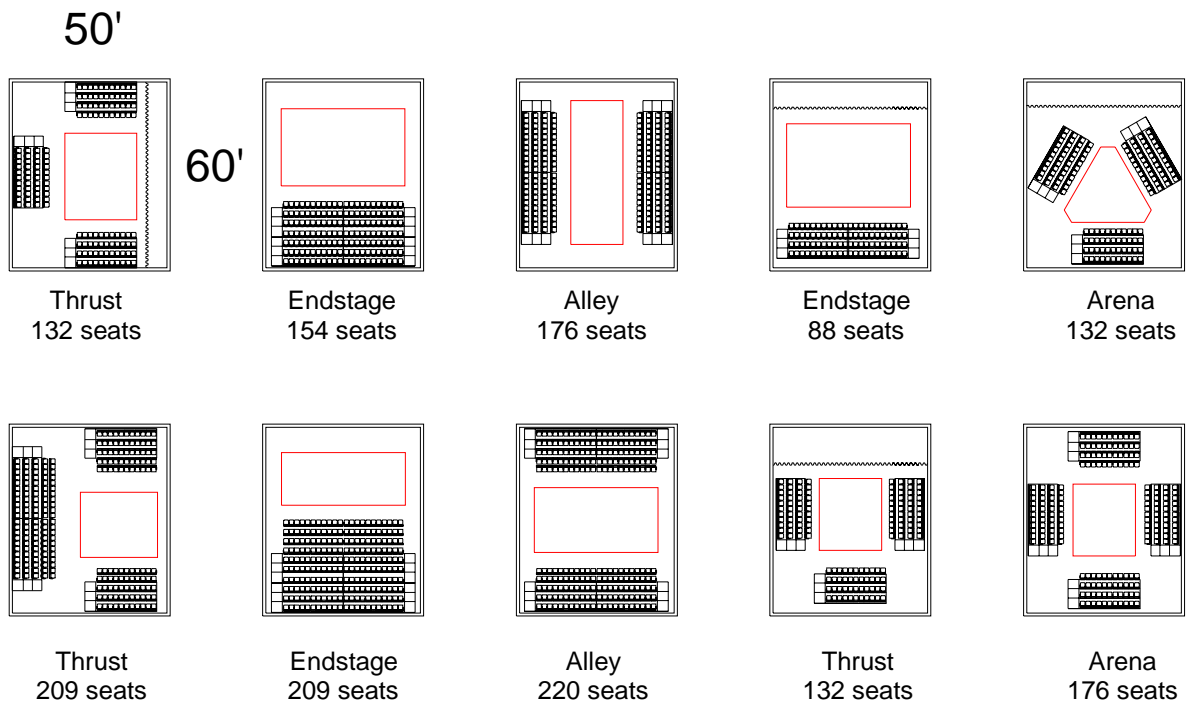
The Studio Theatre provides a showcase for the development and performance of new or experimental work. It is hoped that this venue will have a unique, rough-hewn character that will allow unusual, experimental, or less polished work to flourish in a more informal setting, less threatening for audiences and artists. The room will also function, at times, as a rehearsal space.

The room should be treated as simple rectangle 50' wide, 60' long, and 30' high to the bottom of the roof structure. A stretched-wire grid or catwalk system will be suspended within this volume at approximately 20' above the floor to provide stage lighting positions and access to rigging/hanging points. Simple and direct access to the loading dock, shop, and storage areas of the facility is critical to the functioning of this space.

The floor of the Studio Theatre will be designed for durability. Although resilient, the floor will not be a dedicated ballet floor.

A system of platforms or telescopic seating units will be developed to create a number of basic seating configurations for up to 200 people. A number of standard configurations should be readily achievable with the platforming system.

Other configurations can be achieved with additional elements custom made for a specific production.



Sample Layouts

102 Performer Circulation Corridor(s)

Because the Studio Theatre is designed to be easily reconfigured, the stage location will vary from production to production. It will be necessary to provide concealed performer access to several points around the perimeter of the room without passing through public areas. At minimum, two actor entrances must be provided at the ends of one of the short walls, and two in one of the long walls. Ideally, actors could access entrances in all four walls without passing through public spaces, however the realities of planning may preclude this possibility.

103 Prop / Scenic Staging Area

Because the Studio Theatre has no wing space, in the traditional sense, space is required outside of the theatre to hold props and furniture that will be needed during the course of a performance. Two such areas are envisioned, which may be treated as alcoves off the two main Performer Access Corridor(s) – one serving entrances on a short end of the Studio, one serving a long wall. Each alcove-like area should be lockable with a security gate or a pair of doors to secure hand props and equipment during non-performance hours when tour groups may be moving through the building.

104 Seating Storage / Utility Space

Space is required to store unused seating units during activities that require a flat floor. This storage area should be immediately adjacent to the Studio Theatre though doors sized to accommodate the largest element of the seating system.

105 Control Booth

This Booth accommodates up to four crew and staff members during rehearsals, set-up, and performances. For most shows the stage manager will “call” (cue) the show from this location (for some shows the stage manager will be located backstage), and the audio system, stage and house lighting systems will be controlled from this location.

The room requires 24-hour temperature and humidity control to protect the control electronics. The booth is best be located along the short end of the Studio closest to the typical audience entrance, and must have an excellent unobstructed view of the stage. It must be acoustically isolated from the audience areas, but an operable window is required. A circulation path should be provided to this room that does not pass through the seating area. Access to a nearby restroom is important, although this can be a public or backstage restroom. Telephone service to this room should be provided with mutable bells and low intensity indicator lights. An ADA accessible path is required for crew members in wheelchairs.

106 Dimmer Room

The dimmer room will accommodate stage and houselighting dimmer racks and related switchgear and panelboards. The room requires 24-hour temperature and humidity control, and its location must permit efficient conduit paths to stage lighting loads over the stage and auditorium. Crew access is required for routine maintenance and emergency repair.

Consider these rooms in a similar manner to control rooms. Consideration must be given to other heat producing equipment within the dimmer room including other dimmer racks, transformers, etc

107 Dimmer Room

The Audio Rack Room room, containing amplifier and audio racks, the central production intercom system, and related panelboards, will need to be acoustically partitioned to prevent fan noise from entering the theatre. This room also requires 24-hour temperature and humidity control to protect the control electronics. Crew access for maintenance and repair must be fast and direct.

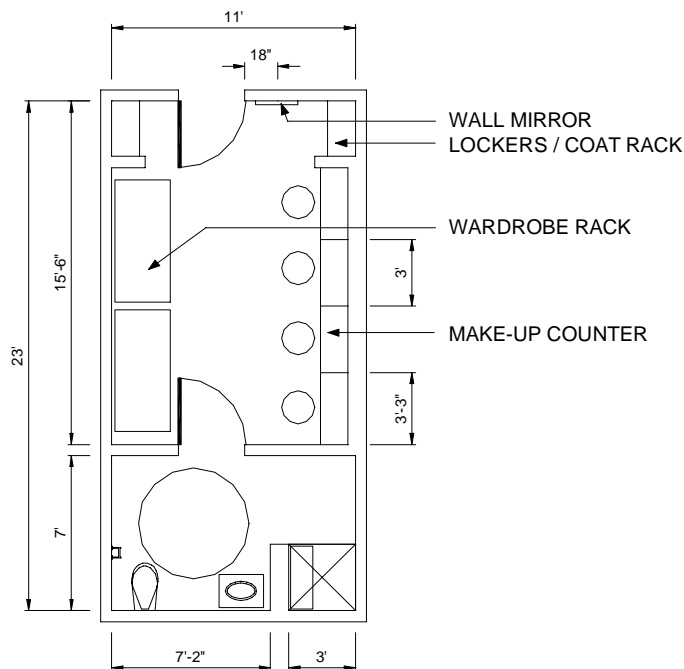
200 Backstage and Support Spaces – Studio Theater

Performer Accommodations

A variety of support spaces are required in addition to those described above. Some are mainly dedicated to this particular theatre, and others, described in sections 1500 and 1900 below, are shared among all three theatres. Performers and crew need to move directly and quickly between the stage and dressing room areas, and corridors should be treated in accordance with the recommendations described at the beginning of this document. The general circulation should follow the pattern diagrammed for the New Guthrie Thrust Theatre in Section 200 above.

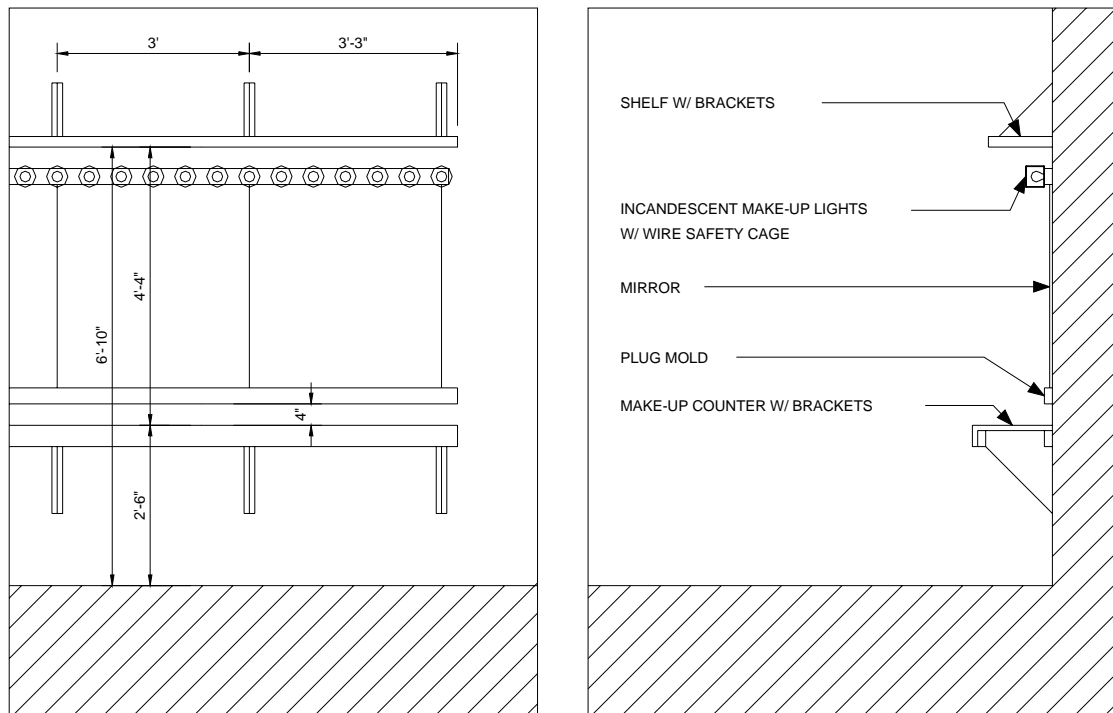
201 Dressing Rooms

The dressing rooms are the areas where the performers change into costume, apply makeup and prepare prior to the performance. One type of dressing rooms is required – an FDA diagram of a typical layout for this type of room is shown below for interpretation by the architect:



Four-Person Dressing Rooms

Each room requires general illumination in addition to incandescent task lighting mounted at the mirrors as shown below.



Make-up Mirror Lighting

Each dressing room should have at least 1 full length mirror.

The dressing rooms must be located in immediate proximity to the stage and a short distance to the “hub”. The dressing rooms for each theatre should be grouped in one area of the building to provide convenient access for artistic staff, wardrobe crew, and stage management. Access to the stage is critical and must be as direct as possible. Ideally, all rooms are on stage level, however if this arrangement is not possible a convenient stair and fast elevator must be provided.

202 Off-Stage Toilet

The off-stage toilets are readily available to crew, staff, and performers working on stage. They should be located immediately adjacent to the principal stage entrance from the dressing rooms.

Production Support / Work Areas

203 Lighting Instrument Storage

Local storage is provided for lighting fixtures, cable, lamps, tools, accessories, and supplies.

204 Sound Equipment Storage

Provides storage for audio equipment including microphones, stands, cable, amp racks, loudspeakers, and musical instruments.

300 Front-of-House and Public Spaces

The special mix of activities and visitors needing independent access and circulation leads to a somewhat complex set of requirements. As noted at the beginning of this document, there are several categories of public visitors to the building:

- The Theatre-going public,
- Visitors that may not be attending performances,
- Educational programming attendees,
- Ticket buyers for future performances.

All these visitors need to be accommodated in a well-marked and welcoming environment that also permits controlled access to the theatres themselves for ticket-holder. The following diagram attempts to describe the many kinds of access and the required security points.

The general approach is to allow access to selected areas of the building at all times, but to restrict access to the majority of public spaces to performance hours. This will permit more efficient operation of the facility. A ticket-taking strategy will have to be developed that permits an appropriate degree of public access without compromising operating efficiency and ticket-security. The following section describes the public lobby areas of the building and their support spaces.

Front-of-House and Public Spaces

301 Box Office Foyer

The Box Office Foyer is the principal entrance for the public, and can be accessed without a ticket for an event.

In the Foyer the public must be able to buy or pick-up tickets, wait for friends, use a payphone and patronize the Gift Shop. From the Foyer one enters the Lobby Areas. During the day the Foyer may often be the only lobby space open to the public.

Patrons will queue in the Foyer for the box office windows and ample space should be provided out of the main traffic flow for this purpose. Finishes in the Foyer should be able to withstand moisture and dirt tracked in from the outside. The floor should be slip-resistant and easy to clean.

302 Box Office Suite

The Box Office Suite will include the following areas:

- Box Office Manager's Office with vault
- Supervisors' Workstations
- Sales Windows
- Telephone Stations
- Group Sales Workstations
- Storage

The Box Office Suite should be treated as a contiguous secure area, although if necessary it can be arranged on two levels with a dedicated interconnecting stair. The Box Office windows are to be directly approachable from the Box Office Foyer. Access from the suite is ideally from a private area, such as an administrative suite or backstage corridor. Security is of course an issue.

This area is often the primary point of contact between the public and the facility's staff. It usually located off the lobby. It is often desirable to have the ticket office within an outer lobby so that the bulk of the lobby may be secured when not in use and the ticket office is open.

Often peak activity will occur in the ticket office 30 minutes prior to curtain time, it is consequently important to locate the ticket office so congestion does not block the building's entrance during these times.

Several activities are handled by the ticket office; over-the-counter sales, telephone, mail and internet order processing (including subscription fulfillment), and telemarketing, and these vary over the course of the day:

- In person sales and pickups occur at a low level throughout the day peaking in the half-hour prior to curtain time. This type of sale involves the individual handling of each order.
- Telephone sales, mail and internet orders occur throughout the day and are processed in batches.
- Provisions and accommodations for future developments in internet-based ticket sales and distribution should be considered.

303 Shared Lobby Areas

The look and feel of the lobby areas, together with the theatres themselves, will establish the institutional character of the theatre for its patrons, and define their feeling of relationship to it. Ease of access, appearance, and comfort, and the amenities and services provided all will have an impact on audience development and loyalty. Because this is such a critical issue, it will require much discussion.

The design of the lobby space should support the essential activities that take place there. Vantage points to watch the crowd, intimate spaces for small gatherings of friends, places to sit and have drinks, coffee or light desserts from the service bars, spectacular views, and a gracious way to move through it all on the way to your seat may all be a part of the lobby experience.

Opportunities will be sought to maximize the revenue earnings potential of the public areas. At times, events may occur in the lobby that are completely unrelated to performances. These will require catering support.

Drinking fountains and pay phones should be provided for public use. Positions should be provided for the incorporation of video monitors for latecomers outside the theatre entrances. Special consideration should be given to lobby acoustics, which should be conducive to conversation as well as amplified speeches associated with special performances or rental uses. At the same time, the lobby should not feel or sound dull, empty, or lifeless.

The lobby area allocation that is included in the Program is arrived at by adding several components together. The allocation is comprised of two specific allowances. One allowance is made for the circulation elements required for code compliance and technical functions, such as public stairs, sound and light lock vestibules, and corridors leading between the lobby and seating areas or exits. An additional allowance is made to expand the public spaces beyond what is minimally required for technical compliance and provide space for the social functions, amenities, and activities that should take place in the lobby.

All these allowances together should be thought of as one single lobby allocation – the various numerical sub-components do not have to be physically distinguishable from each other.

304 Public Restrooms

These areas are high volume operations that have low levels of activity before and after the performance and large rushes of activity during the intermissions. Most applicable codes require fixture counts below industry standard. Consequently FDA programs significantly larger areas than those generally required by code. Restroom facilities should be located within proximity to the audience seating areas as a means of minimizing travel time. Since its peak activity is coincident with that of the concession areas, a physical separation is usually advisable to prevent congestion. Great care must be taken in their location to prevent plumbing noise intrusion into the auditorium.

Provide fixtures as follows:

- (1) fixture per 24 to 30 patrons
- 60% Women
- 40% Men

Accessible stalls must be provided as required by local codes and the ADA. A chaise lounge and vanity space should be provided in the women's restrooms.

305 Food & Beverage Serving Stations

Highly visible locations in areas of the lobby that will not interfere with general circulation should be provided to accommodate service counters. Fixed counters should be distributed on all lobby levels, if possible, with the largest amount at the principal lobby level. Final details remain to be developed, but these counters will likely serve a variety of items including drinks, coffee, and light pastries or snacks.

Stations include:

- Espresso Café
- Wine and Pastry
- Standard Beverage
- Food Serving Station

These areas are high volume operations that have lower levels of activity before and after the performance and large rushes of activity during the intermissions. The sale of refreshments constitutes an important income source for the theatre, and every effort must be made to maximize the number of patrons that can be served during the limited time available. Since its peak activity is coincident with the restroom activity a separation is usually advisable. Bars will require power, and may require water, drainage and piped beverage supply.

Additional portable service bars may be utilized throughout the lobby for certain events on an as-needed basis.

Refrigeration equipment locations will be subject to the noise-isolation concerns of the project acoustician.

306 Bar Storage & Prep room

Provide one central support space for the fixed and portable service bars in reasonable proximity to the bar locations. This space will be used for bar/concession preparation, ice making, and locked storage of liquor stocks. The room must be remote from the audience chambers for noise control purposes.

Provide refrigerated storage for food and beverage items directly adjacent to the Bar Storage and Prep Room. The room must be remote from the audience chambers for noise control purposes.

307 Lobby Storage

Provide storage for a variety of lobby-related items including:

- Ropes & Stanchions, rain runners, etc.,
- Display materials, photographs, posters and temporary easel-mounted signs,
- Portable temporary service bars or merchandise kiosks.

FOH Support Areas

308 House Manager's Office

The House Management Staff manages the usher staff, concessions, coat check, patron services/concierge desk, first aid, and public safety. The house manager needs proximity to the lobby areas, box office, concession support areas, and the theatres themselves. Provide desk and file space for House Management staff members, accessible directly but discretely from the lobby.

309 Theatre Services Manager's Office

Provide an office for the Theatre Services Manager very near the Lobby. Provide a desk, power, and media and communications connections. The Theatre Services Manager oversees contracted cleaning services, liquor sales, and lobby rental events.

310 Usher Room

Provide small lockers for ushers for storage of outerwear and valuables during performances. Lockers should have proximity to Lobby and House Manager.

311 Program Storage

Provide storage at each auditorium level for storage of cartons of event programs. Large numbers of programs in cartons will be received at the stage door and distributed to storage rooms at each lobby level.

400 Common Performance Support

401 Stage Door Lobby

All personnel working in the facility will enter through the stage door. It should be convenient to staff parking, the street and primary use areas backstage. The stage door is the central control point for the authorization and identification of all persons who work in or visit the offices or backstage areas. It will also house the primary security monitoring station, fire command station, cast mail boxes, and reception area.

Performers, staff, crew, and certain visitors enter and leave the building through this entrance. The Stage Door Area consists of two areas – a Lobby Area, and a Reception Counter.

Stage Door Lobby Area

The Stage Door Lobby provides a place for visitors to wait until they are met by staff members or performers. A pay phone should be provided in the lobby, as well as comfortable but durable furniture. Office delivery persons enter this area to drop off or pick up packages from the Stage Door Desk. Access beyond the lobby is controlled by security staff at the reception counter. Provide “buzz-in” staff operated locks on inner access doors. All doors must be wide enough to admit delivery hand-trucks.

Reception Counter

Security staff working at this desk monitor the stage door and security systems, receive packages and messages, and control dressing room key-pad access codes. Packages are held for pick-up behind the desk to prevent the Lobby area from becoming cluttered. A package storage area will be required within the Desk area, in addition to the fire control and security systems mentioned above. Packages and freight may include:

- Mail
- Fedex / UPS Deliveries
- Office supplies in bulk.
- Housekeeping supplies in bulk
- Front of house supplies such as cartons of programs.
- Marketing materials such as cartons of fliers.

Notice board

In a central location near the stage door and Hub, provide a large bulletin board for the posting of notices to company and staff members

402 Dram / Greenroom

This space accommodates many needs and will serve as an important spiritual heart of the facility. A crossroads of sorts, in this space staff, crew, and performers will gather and mingle informally on a daily basis. The Dram is a sort of bar/lounge for the use of cast & staff members.

The space will act as a performer’s lounge, a rehearsal break room, a staff and crew lunchroom, and an informal reception room following performances. From time to time the space may be used for cast meetings. Natural light is very desirable, although privacy from the public is very important. This

space is the actual center of the “Hub”, and the backstage areas of all three theatres must be directly accessible to it.

A kitchenette area with a two-compartment sink, large refrigerator and microwave are needed for general use. Provide counter space for large coffee urns, toaster oven, and microwave oven.

Provide a full-length mirror and tack board. Furnishings should include comfortable, durable lounge furniture, tables and chairs.

403 Vending

Provide a location within the Hub near the Dram / Greenroom. Provide for the installation of the following:

- Bill changing machine
- Soda/Juice Machine
- Candy/Snack Machine
- Payphones

404 Food Prop Prep

At the Hub, a small kitchen is required for preparation of food props. Provide a two-compartment sink, dishwasher, large refrigerator, oven/range, and microwave. Provide counter space for a toaster oven, and other appliances. Provide cabinets and drawers under and over countertops. Exhaust and ventilation systems per local regulations for kitchens.

405 Wardrobe Workroom

At the Hub, provide space for wardrobe staff to use during the course of a show. Staff working from this location will assist actors with difficult changes, oversee the handling and preparation, and use of costumes during the course of each performance, and repair and maintain the costumes during the course of a run. Close proximity to the dressing rooms and stages for all three theatres is essential.

Sewing machine(s), iron(s), and steamer(s) will be required. The space should be located adjacent to the Wig Running Room, the Washer Room, and the Wardrobe Manager’s Office.

406 Wig Running Room

The Wig Running Room is where wigs in use onstage are placed on the actors, dressed, and maintained during the course of the show, as well as cleaned and styled before performances. Close proximity to the dressing rooms and stages for all three theatres is essential. Good ventilation is very important, since hairspray and other volatile liquids are in use. Good directed incandescent lighting is required.

407 Wig Maintenance

A walk-in spray booth with a table is required for use when spraying acetone, dyes, and other volatile liquids. Provide a hood and ventilation per OSHA requirements. The booth must be directly connected to the Wig Running Room.

408 Washer Room / Laundry

The Washer Room is where costumes and underwear are laundered between shows. The Washer Room should be in close proximity to the dressing rooms and stages for all three theatres. The space should be located adjacent to the Wardrobe Workroom, and the Wardrobe Manager’s Office. The laundry room should be well ventilated to prevent heat build-up, and acoustically isolated from sound-critical areas of the building. A floor drain must be provided.

409 Wardrobe Manager's Office

An office for the Wardrobe Manager, with desk, communications and data connections. The office should be directly adjacent to the Washer Room / Laundry and Wig Running Room.

410 Run Crew Ready Room

A room is to be provided at the hub as a "home base" for run-crew members before and between their activities. An audio and video monitor linked to the stage is desired.

411 Run Crew Supervisor Office

Provide an office for the Run Crew Supervisor with a desk, power, and media and communications connections. An audio and video monitor linked to the stage is desired.

412 Run Crew Supply Storage

Provide storage space for tape, rope, tools, equipment, ladders, lifts, scaffolds, etc. used by the crew in the running of shows, with a minimum of 10' clear height. Storage area should be easily accessible from the three stages, directly or via the freight elevator.

500 Building Services

This office is often charged with the coordination of all non-performance specific aspect of the facilities operation. This may include HVAC, building construction trades, maintenance, custodial, garbage collection, management information systems, and sometimes concessions management.

Offices should have natural light and excellent proximity to the stage door and stage.

501 Building Engineer Office

Office for building engineer. Space for standard office furniture and flat files. Proximity to mechanical rooms, and Building Engineer Workshop.

502 Building Engineer's Workshop

A workshop for building maintenance and repair, including seats, door hardware, plumbing, and electrical and mechanical systems. Includes storage for spare parts and supplies.

503 Janitor Closets

An allowance for Janitors' closets throughout the facility. Typical closet should include slop sink or mop sink and storage shelving for local supplies, such as paper goods in the restroom area, sweeping compound, etc. Janitors closets should be located to serve all areas of the facility, including the theatres and public areas, administrative offices, rehearsal spaces, educational spaces, and special amenities.

504 Janitorial Supplies

Central storage area for building-wide janitorial supplies and equipment.

505 Loading Dock(s)

In either case dock access for load-in and removal of items from each of the stages without impacting shop activities is critical.

Level access must be provided for rolling boxes and crates from the receiving point to the stage, dressing rooms, wardrobe and wig rooms, company offices, understage areas, orchestra pit, storage rooms, and rehearsal rooms.

The loading docks are ideally rain-protected platforms built at truck-bed height above the pavement, fitted with roll-up doors and dock levelers. Given the climate, weather protection is critical. Air seals, mechanical air curtains or other devices must be employed to prevent massive heat loss during loading. Fully enclosing the dock(s) in a properly conditioned and ventilated "garage", while ideal, is not presently reflected in this program.

Provide access stairs and a separate personnel door for driver access with security and communications links to the Stage Door Reception Desk. Gates should be provided to secure the trucks overnight and to prevent unauthorized access to the building through the dock area when these doors are open.

Trucks the loading dock(s) must accommodate include:

- Pickup trucks and vans carrying small items and supplies.
- Straight Trucks carrying equipment and scenery. These vehicles are often used for local transfer of goods and small tours.

Freight handled includes:

- Theatrical scenery that comes in irregular shapes. Delivered to the stages, shops, storage areas, and rehearsal areas.
- Lumber up to 20' long.
- Sheet goods (plywood, etc.), typically 4' x 8', and sometimes up to 4' x 10'.
- Steel and pipe up to 21' long (6400 mm) delivered to the stage, shops, trap rooms and storage areas.
- Musical instruments delivered to stage, rehearsal and storage areas.
- Crates and wheeled road boxes delivered to stage, rehearsal, dressing rooms, shops and storage areas. These boxes can weigh up to 2000 pounds (910 kg).
- Wardrobe crates delivered to dressing room, wardrobe, costume shop and storage areas.
- Building supplies including metals, wood, plastics, and liquids delivered to stage, shops and storage areas.

Other functions the loading dock must accommodate include:

- Trash and dry garbage accumulation and removal via small containers and dumpsters.
- Hazardous waste and recycling materials accumulation.
- Media truck parking for the recording or broadcast of special events.

Grade should be as flat as possible. Event cargo is often transported in heavy, wheeled roadboxes. A sloped bed can give rise to accidents from runaway crates.

Provide one 9'-0" (2750 mm) Wide x 10'-0" (3050 mm) high door with enclosures per bay. Bays should be 14'-0" (4270 mm) wide (12'-0" ((3660 mm) minimum). Docks accommodating trucks should have 14'-6" (4420 mm) clear height.

Docks accommodating dumpsters many require up to 25'-0" (7620 mm) in height to accommodate the pickup and discharge of large dumpsters.

In addition to general lighting in dock area, pivoting or adjustable fixtures are needed for lighting inside trucks.

Cable passes should be provided between the dock and the performance platform area. These may take the form of troughs, tubes, or hatches.

Docks must be acoustically isolated from the theatre so dock activities or idling trucks to not disturb performances.

STAGE RIGGING and EQUIPMENT: Studio Theater

Wire Rope Grid

Access to stage lighting and rigging will be by means of a wire rope grid. A wire rope grid consists of a steel grid frame, decked with a network of 1/8 inch wire ropes woven in a two inch mesh (similar to the strings on a tennis racket). The wire rope surface is walkable. Light pipes are clamped to the grid hangers as required; stage lighting hung above the grid can shine through the wire mesh without shadowing on the floor below. The wire rope grid defines the ceiling of the room, resulting in total flexibility for lighting and rigging positions.

Stage Draperies

Masking curtains will be unlined black velour, sewn flat. The drapery inventory will also include a muslin cyclorama, as well as black and white sharktooth scrims. Goods will be bagged and stored in castered hampers.

Variable Acoustics System

Per the Acoustical Consultant's design, there may be a system of variable acoustics curtains, to adjust the acoustical reverberant properties of the space.

Rigging Hardware

An inventory of pipes, beam clamps and chain will be provided for "dead hung" (i.e. stationary) rigging. Rope blocks and demountable pinrails will also be provided for movable rigging.

Seating Risers

A flexible seating riser system will be provided. The riser system will achieve a variety of seating configurations, including end-stage, alley, thrust, and arena.

PRODUCTION LIGHTING SYSTEMS: Studio Theater

Stage Control System – This system will include a number of twenty and fifty ampere high-density, solid-state dimmers that feed in a dimmer-per circuit configuration receptacles in outlet boxes, drop cables and connector strips above the auditorium, above the stage, side lighting positions and at stage floor level, basically throughout the stage house.

The system will be controlled by a theatrical stage lighting computer console that will enable the user to establish, record, and recall preset intensity levels and fade times. The console can be operated from several locations in the theatre including: stage right, stage left, control booth and the rehearsal station located in the orchestra level seating. There will be a stage right and left and control room equipment racks with worklight controls, house lighting controls, and other miscellaneous equipment.

House Lighting Control System – This system will include a number of high-density, solid-state dimmers that feed branch lighting load circuits for the auditorium or "house" lights. The houselight system will have a small electronic memory to establish, store, and recall preset intensity levels and fade times. Tour lights and cleaning lights will be a part of this system.

Emergency lighting as required by local building and safety codes can be a part of this system. Architectural lighting design layout and fixture selection is by architectural lighting consultant.

Data Control Wiring - This is the low voltage wiring from the auxiliary electronics rack in the dimmer room to each of the data receptacle stations located throughout the stage house. The data control system will utilize a computer grade Ethernet cabling to create a network that will support a wide range of lighting control devices and peripherals. This new method of data control wiring, which combines all lighting control signal protocols including the dimmer protocol DMX-512, is evolving into the new standard.

Stage lighting circuit and control wiring (high and low voltage) should be in new metal conduit, physically separated from each other in order to prevent interference on control signals from electrical equipment. This system would be designed by the theatre consultant and shown on the electrical engineer's drawings for provision and installation by an electrical contractor and or licensed network cable installer.

Stage Lighting Dimmer Rack (SDR)

The dimmer rack shall be fully digitally controlled with 16-bit microprocessors, designed specifically for entertainment lighting. The dimmer rack will consist of individual freestanding cabinets, each cabinet can hold up to 48 plug-in dimmer modules in sizes of 2.4kW and 6.0 kW. The stage lighting system will be designed for a dimmer per circuit configuration.

The stage lighting dimmer rack shall have the following features:

- A. (276) 2.4kW "long" rise-time dimmers.
- B. (6) 6.0kW "long" rise-time dimmers.
- C. Dual electronics processor module for full redundant tracking backup.
- D. Output voltage regulation, to compensate for load circuit voltage loss.
- E. Remote dimmer diagnostics, allows monitoring of dimmers and outputs.
- F. (32) user programmable back-up preset.
- G. Dimmer over-temp system.

House Lighting Dimmer Rack (HDR)

The dimmer rack shall be fully digitally controlled with 16-bit microprocessors, designed specifically for entertainment lighting. The dimmer rack will consist of individual free-standing cabinets, each cabinet can hold up to 48 plug-in dimmer modules in sizes of 2.4kW and 6.0kW.

The house lighting dimmer rack shall have the following features:

- A. Per the architectural lighting consultant's design, the required quantity and size of "long" rise-time dimmers will be provided.
- B. Worklight contactor modules (quantity to be determined).
- C. Running Light contactor modules (quantity to be determined).
- D. Non-dim contactor modules (quantity to be determined).
- E. Cue-light contactor modules (quantity to be determined).
- F. Dual electronics processor module for full redundant tracking backup.
- G. Output voltage regulation, to compensate for load circuit voltage loss.
- H. Remote dimmer diagnostics, allows monitoring of dimmers and outputs.
- I. (32) user programmable back-up preset.
- J. Panic relay system.
- K. Dimmer over-temp system.
- L. Aux. Cabinet for branch circuit breakers and other auxiliary components.

Emergency Transfer Panel

The emergency transfer panel will be designed to automatically transfer critical house and worklight load circuits from the houselight dimmer rack to an alternate power source when the normal power fails. The stage lighting dimmers will not be transferred to an alternate power source. The project electrical engineer shall determine what fixtures and lighting circuits shall comprise the system.

Control Console Plug-In Stations

The control console plug-in station is a surface mounted box mounted underneath the counter in the control room and other locations throughout the theatre. This station provides power and control wiring for the stage lighting control console and is connected to the stage lighting Ethernet network.

Cleaning Light Station(s)

The cleaning light station is a single gang wall plate with a key switch. This station shall activate a group of houselight or worklight circuits to a pre-programmed level. This station shall function only when the houselight system is off, and shall be disabled when the houselight system is turned on.

Ethernet Tap Station(s)

The Ethernet tap station, depending on the location, is a recess wall plate, surface mounted box or pipe mounted box. This station shall provide data distribution over a TCP/IP Ethernet Network which shall allows DMX devices, such as, color scrollers and moving lights and other control devices to plug-in and be connected to the stage lighting network system. The station will have the following control receptacle:

- A. (1) Ethernet receptacle.
- B. (1) 15A duplex receptacle.

Remote Ethernet Node(s)

The remote Ethernet node, depending on the location will be a surface or pipe mounted box. There will be two types of remote nodes, video and DMX. The video monitor output at any video node shall monitor the video of any control console connected to the lighting network. Each video node shall have discrete display access to any console and any console display. The DMX Node shall control up to 2048 DMX addresses, within the confines of an up to 8 DMX (4096 DMX addresses) "universe" system. The specific DMX data input or output by the Node shall be freely configurable by the user. Duplicate outputs of DMX lines (DMX splitter) and discrete outputs shall be fully supported.

Any number of DMX lines may be configured with any length up to 512 addresses as long as the total does not exceed 4096. Each DMX line may have its own label and start address for ease of use. DMX ports shall be configurable for either input or output. Multiple DMX signal routing patches and multiple facilities shall be specifically supported and limited only by the file storage capacity of the computer with Net software installed. The Network shall support Parallel, Remote and Tracking Back up operation of control consoles. File transmission, synchronization and access to File Servers using Microsoft NT server software shall be specifically supported. All Network configuration information shall be available as a system printout.

Stage Lighting Fixtures

There will be a full compliment of state-of-the-art fixtures, including the latest in ellipsoidal reflector spotlights, fresnels, stripslights, borderlights, Par Cans, etc. These fixtures will be able to be hung from the lighting pipes above the wire rope grid and box boom positions above the stage. There will be approximately 200 stage lighting fixtures and two followspots.

Company Switch

There will be one 400A company switch to allow for power for incoming touring companies. This disconnect will have a set of receptacles for portable cable tie-in. The disconnect switch will be fitted with cam-lock receptacles. Disconnect switch location is to be determined. Switches will be located at stage right lighting gallery.

Utility Power

There will be a series of 100A disconnects located throughout backstage to provide for utility service. These disconnects will have a set of cam-lock type receptacles for portable cable tie-in.

PRODUCTION VIDEO SYSTEMS

Video Camera System

The Video camera systems will consist of two balcony rail mounted cameras and one orchestra pit camera. One of the balcony rail cameras will be a color camera with motorized remote control of pan, tilt, zoom and focus. This camera will be used for general purpose stage monitoring and provide a feed to video monitors in the lobbies for latecomers. The other balcony rail camera will be an IR camera with fixed-focus lens. Infrared illuminators mounted to the balcony rail will allow the IR camera to create an image when there is no visible light on the stage. The IR camera will allow production personnel to monitor the stage during black-outs. An orchestra pit camera will be a monochrome CCTV camera and will allow production personnel or an off-stage chorus to see the conductor. The Studio Theater will have two video cameras (one color and one IR) for use in the space.

Base Band Video

The base-band video (CCTV) distribution system will consist of video stations, video distribution amplifiers, and video patch bays, all interconnected by precision 75-ohm video coaxial cable. As well as distributing signals from the balcony rail and orchestra pit cameras, the base-band system will be able to distribute video signals originating at any base-band video station. The stations will be located throughout all the stagehouses and auditoriums in all venues for auxiliary cameras and monitors. A master control center will be located in the Main Hall.

Broad-band Video

The broad-band video (CATV) distribution system will be a cable TV distribution system using the same type and quality of equipment used by cable TV companies. The system will distribute the local cable TV company's signal plus five or more local origination channels (two for the Main Hall one for the Studio Theater). The local origination channels will be capable of feeding from the color balcony rail camera with superimposed graphics as required (see video character generator below). The CATV system will distribute the broad-band signal to many receptacles located in the lobby, dressing rooms and offices throughout the facility. The video cable head-end will be located in the Main Hall.

Video Monitors

Video monitors, will be provided in control rooms, dressing rooms, offices, lobbies and similar spaces to monitor ongoing stage performances and rehearsals. Latecomer video monitors will be strategically located throughout the lobby areas to show performance video to patrons waiting to be seated in each theatre.

Video Character Generator

A Video Character Generator will be provided; it will include built-in downstream keyer. The keyer will superimpose the output of the character generator over the output of the color, balcony rail mounted video camera. The output of the keyer will feed a television modulator.

SOUND and COMMUNICATIONS

The Sound and Communications system includes sub-systems for amplification in the auditorium and production communications.

Production Sound

The production sound system will consist of a flexible system of trunk wiring, receptacles, and equipment for the following functions:

A **multi-channel speech and music reinforcement and playback system** (left, center, right) amplifies events and provides the appropriate loudness and intelligibility for the audience. Loudspeaker arrays typically located above the stage area, and sometimes in other areas of the audience chamber, are typically required. This system also provides feeds for onstage monitoring for performers interface with outside recording and broadcast systems. Fixed sound system equipment will reside in the sound control room and the amplifier rack room. Portable equipment, such as microphones, monitor loudspeakers, and stands will also be provided.

Simple archival tape recording (analog and digital) will be available for the facility's documentation of events.

An assistive listening system for the hearing impaired will be provided in conformance with the requirements of the ADA..

Production Communication

The production communications system will consist of a flexible system of trunk wiring, receptacles, and equipment for the following functions:

A **Show Program Monitor System** provides a way for staff and performers to hear the event occurring onstage through ceiling-mounted loudspeakers distributed throughout the building in dressing rooms, offices, and other critical areas. Multi-zone paging is also available through these same loudspeakers. Typical paging zones include backstage areas, control rooms, front-of-house areas, and stage/auditorium. Fixed communication system equipment will reside in the communication rack room.

The **Production Intercom System** allows for the communication of design and technical staff during rehearsals and performances, generally through headsets.

The **Production Video System** allows for visual cueing during rehearsals and performances. Fixed cameras are typically located on the first tier balcony front and in the orchestra pit. Portable cameras can be located in a variety of locations as required. The output of these cameras can then be distributed to portable video monitors and/or recording equipment. This system can also supply a color video signal to video monitors in the lobby (for latecomers) and throughout the building as needed.

CONSIDERATIONS FOR DESIGNING ELECTRICAL SYSTEMS

Electrical Supply

Early discussion should take place with regard to the type of incoming electrical supply to the building, the location of any mains transformer sub-station and locations of any step down transformers supplying panel boards.

The incoming electrical supply and switchboard should be positioned having regard to the location of any main transformer sub-station and to the routing of large cables from the switchboard to panel boards located around the building.

The switchboard should ideally be located in a position suitable for the isolation of any noise from the whole of the electrical installation, but also have easy access by authorized personnel in an emergency.

In addition to normal lighting, power, heating and mechanical plant, the main switchboard will feed panel boards/switchboards supplying power to the following equipment:

- Dimmer and Remote Switching Cabinets including:
- Production lighting (dimmers & non dims) dimmer cabinets.
- House lighting dimmers.
- Work light system controls (dimmers & non dims).
- Emergency power transfer panel. Battery or generator connecting in part to dimmers and remote switching cabinet.
- Performance rigging equipment. Typically individual supplies to disconnects adjacent to each item of installed equipment.
- Touring dimmer supplies, located on or at the side of the performance platform for the connection of portable dimming equipment on a temporary basis.
- Recording and Television broadcast vehicle supplies (radio, video and film) on a temporary basis.
- Lighting and general power in control rooms, follow spot rooms, projection rooms, etc.
- Isolated ground supply for installed Sound and Communications equipment. Isolated ground supplies are distributed from separate panel boards and must not be used for any other service.
- Isolated ground supply located on or at the side of the performance platform for connection of portable Sound and Communications systems on a temporary basis.
- Disconnects and receptacles for connecting portable items of lighting, effects, welding and rigging equipment on a temporary basis (buss duct with local disconnects located on the performance platform, catwalk, followspot, and control booths, etc.).
- Conditioned power supply on emergency circuit for computer equipment. These systems will be in ticket office, lighting control booth, sound control booth, security control, and office areas.
- Sound shop and mix rooms require isolated ground supply.

It is essential that supplies to theatres are stable and permanent to avoid loss of performances and audience panic. Code requirements may necessitate the need for a permanently installed generator set powering selected circuits via an Auto Transfer switch or a dedicated emergency lighting system. The generator will need to supply power to certain branch circuits associated with the house lighting dimmer system. Refer to Emergency Lighting section.

Dimmer And Remote Switching

These panels and cabinets should be located in a centralized room that is designed to contain the noise and dissipate the heat generated by the dimmers. This room should be situated to accommodate efficient conduit, wiring and electrical feed runs.

Production Lighting

A typical production lighting system comprises a control console, dimmers and distribution system to lighting instruments within the auditorium and performance areas.

The dimmers are manufactured, delivered and commissioned by a specialist manufacturer. However, the electrical contractor will be expected to take delivery, store (if necessary), install providing all wireways, conduit, wire and terminations, to coordinate with the manufacturer and to assist the manufacturers with tests and commissioning.

The dimmers should be installed in a room with access limited to authorized personnel. This room should be located near to the load center of the production lighting circuits to reduce the runs of branch circuit wiring. This is normally at fly gallery level or lighting bridge level near to the performance platform.

The dimmer room should be provided with an acoustic and light lock in adjoining the performance platform or auditorium. Access is required to enable technicians to reach the dimmer room without disturbing the public during a performance.

The dimmer room must be kept clear of all other non-electrical services and must not be used for routing ventilation ducts or pipes for water or drainage. All internal surfaces of this room must be dust free and the room free from condensation. Before installation of the dimmers, all work by other trades must be complete and the air conditioning must be operational.

The space required for the dimmer racks, associated switchgear and maintenance space will be advised by the Theatre Consultant. This is usually between 150-200 sf (14 - 19 sm) with a ceiling height of not less than 8'-0" (2440mm). Final size of the room to be determined by design team dependent on agreed contents of room. A larger floor area will be needed if the room is not a regular shape or if it does not have clear wall space. Conduit risers are not considered part of this area.

Branch circuit wires from the dimmer racks feeding production lighting circuits must be sized to ensure that the voltage drop at the production lighting receptacles does not exceed 5% of the nominal supply voltage (excluding the voltage drop across the dimmers).

The circuits should be designed with the full rating in mind: For example a 20 amp circuit should be sized to accommodate a 20 amp load.

Supplies to the dimmer racks from-the main intake switchboard panel and all outgoing branches must have full sized neutrals throughout. All load circuits shall be pulled with stranded wire to facilitate installation and termination. All load circuits must have individual neutral conductors.

Due to the harmonic distortion content of the production lighting circuits these circuits can cause interference with the Sound and Communications installations. Therefore, the routes of the Sound and Communications and the production lighting circuits must be completely segregated. The two systems must be in separate wireways and physically kept apart.

The production lighting load will vary within wide limits in response to the requirements of the production and lighting designer.

The production lighting receptacles are normally located in connector strips, outlet boxes or may be individual receptacles fanning out from a multicable.

Before the lighting control console may be installed in the control room, this room must be completely finished in construction and all services completed. All internal walls must be dust free and the room free from condensation.

Auditorium Lighting (House Lighting)

The auditorium will be provided with some or all of the following systems of lighting. These must be in accordance with the fire and safety code.

House lighting and decorative lighting branch circuits are fed from the same type of dimmers as those used for production lighting. The dimmers are usually located in the same dimmer room and are controlled from panels in the lighting control room, the performance area and other locations as required.

Cleaning Lighting.

This may include part of the house lighting system but must be bright lighting suitable for illuminating the performance space for cleaning, controlled from circuits generally integrated in the house lighting.

Panic Lighting.

Special lighting or part of the general auditorium lighting or the cleaners lighting provided with controls located to allow a member of the theatre staff to switch the lighting on in the event of an emergency in the auditorium. The design of the panic action must be such that any supply or control failure within the auditorium lighting system will not disable the panic function.

Where there is a theatrical requirement for a black-out of all lighting for a dramatic effect or scene change, etc., it is usually permissible for the lighting to be extinguished subject to the following:

- Any dimming equipment must be only operable by authorized persons and provided with a method of instantly restoring lighting in the auditorium which may be used by the staff on duty in the auditorium
- The emergency lighting must be instantly restored in the event of main supply failure.
- Any control circuit or dimmers operating from both primary supply and emergency lighting supply must be so arranged to maintain the independence of the two systems.
- The EXIT signs in the auditorium are not be extinguished and remain illuminated from an emergency lighting circuit. The EXIT signs should not project light into the performance space.
- The emergency lighting circuits may be powered from the main supply provided that there is instantaneous, fail-safe changeover to a generator set in the event of main supply failure.

Sound and Light Locks (SLL)

Lighting in Sound and Light vestibules and areas adjacent to the auditorium are considered to be part of the auditorium and must be arranged so that light does not spill into the auditorium or the performance platform or in any way distract performers or the audience even when latecomers are entering the auditorium during a performance. Lighting in these areas may be controlled by house lighting dimmers which reduce the level of illumination to a preset level in performance condition.

Aisle lighting

Aisle Lighting should be designed in accordance with applicable codes. Care should be taken to avoid the spillage of aisle lighting onto the performance platform or into the audience member's eyes.

Work Lighting

The work light system controls the fixed general lighting within the auditorium, performance platform and associated areas. The system also controls receptacles to which portable lighting fixtures may be

connected on a temporary basis. The system assists the performance staff to ensure that circuits essential for a performance are on and that non-essential circuits are off.

In most installations, branch circuits are switched or dimmed by remote contactors or solid-state devices controlled by individual local push buttons and controls on panels in the performance platform and control room areas.

All dimmers, contactors, or solid state switching devices utilized will be centrally located within the dimmer room.

The work light system usually comprises the following:

- Work light dimmers, contactor/solid state and/or dimmer cabinet(s) from which branch circuits are fed.
- Work light control panel located in the Stage Manager's control locations on performance platform, in the auditorium, and or control booth. The control panel maybe portable with several control receptacles located where a stage manager may desire to locate for rehearsals or performances.
- Work light control panel in the lighting control room and projection room.
- Local switches controlling designated backstage lighting circuits.
- Switches controlling designated cleaners lighting circuits in the auditorium.
- Typical circuits fed from the work light system-include:
 - Set-up, work and rehearsal lighting (bright lighting on stage and associated areas for setting up, etc.).
 - Cleaners lighting (bright lighting for cleaning the auditorium).
 - Running lights (low brightness, often blue, lights around performance platform and flytower which can remain on in a performance to allow actors and technicians to move safely around a darkened performance platform).
 - Work and service lights (lighting on performance platform, backstage, catwalks, grid, etc. controlled locally and by the Stage Manager).
 - Orchestra lighting receptacles (for orchestra stand lights), controlled either from the Stage Managers or lighting control room panels.
 - Rehearsal lighting (used to illuminate the performance platform for rehearsals when the production lighting system is not required).
 - Stage Manager signal and effects switching (cue lights) will be integrated into the work light systems.

The appropriate system for the work lighting will be recommended by the Theatre Consultant.

Emergency Lighting

An emergency lighting system is required which is available in the event of failure of the main electrical supply. The lighting levels provided by this system must be adequate for the safe evacuation of the public and staff from the building. All emergency lighting systems and equipment must comply with local and national regulations.

Emergency lighting needs to be provided to give an overall illumination level sufficient to enable the public to leave the building in the event of a failure to the mains supply. The emergency lighting system supply has to be provided from an independent supply (not dependent on the normal main

supply) which is typically an automatic start standby generator set. This is usually achieved by transferring selected house lighting branch circuits over to an installed generator set via the Auto Transfer System. Alternately it is achieved by the provision dedicated emergency lighting circuits. A circuit breaker is usually provided in the house lighting dimmer cabinet to sense the absence of normal power.

The emergency lighting also needs to provide minimal light for illumination of the performance area. Where illuminated EXIT signs and aisle lights are installed, these must be fed from the emergency power supply in the event of a mains failure.

A standby generator system has the advantage of being able to maintain other essential facilities so that a short main supply failure would not necessarily end a performance. The generator could maintain the following:

- Emergency lighting systems
- Fire protection systems
- Essential evacuation communications equipment
- Performance Communications Systems
- Essential ventilation
- Elevators
- Minimum lighting of the performance platform.

Performance Machinery

The motor driven equipment in the performance areas will range from small (1HP) hoists to medium and large variable speed drives for revolves and flying equipment. It will only be used intermittently.

A suitable sized supply terminating in a disconnect is normally supplied adjacent to each piece of performance equipment requiring power. The performance equipment contractor will normally be responsible for all wiring and controls associated with his equipment.

Where hydraulic equipment is specified, an electrical supply will be required for the hydraulic pump and control wiring for the control circuits. Some large capacity hydraulic pumps do not require more than normal full load current on starting, but each application must be checked.

The majority of performance machinery systems have limit switches which are mounted on or near the equipment and struck by the motion of the equipment. Wiring to these items is normally by the performance equipment contractor.

It is usual practice to supply performance equipment via separate panel boards in areas adjacent to the performance platform and in the fly tower sized to suit the maximum simultaneous demand of the equipment. This will be determined by the Theatre Consultant for each application.

CONSIDERATIONS FOR DESIGNING HVAC SYSTEMS

Recommendations

- The theatre HVAC systems, must be separate from the rest of the building.
- The systems should be designed for whatever NC level the project's acoustician dictates.
- The systems should have low velocities to avoid blowing or billowing scenery.
- The systems should be capable of high-, medium-, and low-level operation with local controls,
- the first for conventional use when there are full stage lights and an audience,
- the second for use when there are full stage lights but no audience, such as dress rehearsals, or when there is an audience but no stage lights, such as lectures, chamber music concerts, and motion picture programs, and the third for use when there are no stage lights and no audience, such as rehearsal.
- The control room should have stable 70_i to 78_i temperature and no humidity.
- The HVAC systems in these rooms should operate 24 hours, 365 days, regardless of the disposition of the auditorium or stage.
- The followspot room: Conventional cooling and ventilation procedures are necessary.
- The air pressure in the auditorium and the stage house must be balanced to avoid swelling the front curtain in or out.

Systems should be zoned as follows:

- Studio Theatre (one per zone)
- Control Booths (as a group)
- Dimmer Rooms (as a group)
- Shops (as a group)
- Offices (as a group)
- Lobbies
- Dressing rooms (as a group))
- Storage areas (as a group)
- Mechanical areas (as a group)
- Public restrooms (as a group)
- All rooms should have individual thermostatic control. All zones should have humidity controls.

The design of the heating and air-conditioning installations and other major items of plant must prevent starting surges during a performance as these can affect the lighting and Sound and Communications installations. In addition, the acoustic noise of such equipment starting can cause problems.

Auditorium Ventilation and Air-Conditioning systems must take account of small audiences and rehearsals as well as full audience conditions. To minimize noise problems, variable operating speeds may be appropriate, selected by the theatre management to meet daily needs.

Air-Conditioning and Ventilation of performance areas must take account of convected heat from lighting equipment above performance platform and radiated energy from lighting equipment in other

areas. Air movement sufficient to move curtains, blow music, cause drafts in performance area or move scenery must be avoided.

The system should have a pre-cool setting allowing the audience areas to be chilled in anticipation of the sudden load created by the arrival of the audience.

The system should be programmable one week in advance as a minimum. The system will not operate on a regular schedule that is repeatable from week to week.

The control system may be tied into intrusion detection systems where applicable. There may need to be a local over-ride controls for certain zones.

Shop spaces may require dilution ventilation, dust collection systems, welding exhaust hoods, dye vat exhaust hoods, work table exhaust hoods, spray booths, vented flammable liquid storage cabinets or other specialized equipment in accordance with federal, state, and local laws.

Stage, backstage, practice and instrument storage areas should be maintained at a constant temperature in the 65 to 75 degree range with relative humidity kept between 45% to 55%. All areas should have similar environments at any given time.

CONSIDERATIONS FOR DESIGNING STRUCTURE SYSTEMS

This report provides general guidance about specific and unique conditions in the design of structural systems for performance spaces. It describes typical methods of construction where applicable, and presents details of elements where specific features are important to the installation of performance equipment.

Roofs

An important consideration in auditorium design is the spanning of the considerable width of the seating areas, as modern practice does not normally permit intermediate support columns.

In addition to its typical applications, the roof structure may be required to:

- Support a roof cladding which is often of suitable mass and construction to reduce the transmission of noise from outside.
- Support the load of the mechanical systems.
- Support lighting catwalks, associated equipment and associated access ways.
- Support the auditorium suspended ceiling which is of suitable mass and construction to reduce the transmission of noise and act as an acoustic surface.
- Support specialty acoustic treatment as required by the acoustician.
- Support potential performance rigging in the audience chamber.
- Information relating to the noise transmission levels and acoustic reflective surfaces, which have an effect on the loads carried by the roof beams, will be provided by the acoustic consultant.